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09/17/2007 05:11 PM

To Bonita Lavelle/EPR/R8/USEPA/US@EPA
cc "R.R. (Bob) Marriam" <robert.r.marriam@grace.com>, "Robert Medler" <robert.j.medler@grace.com>
bcc
Subject Comments to Draft SAP for Libby OU3 Dated September 7, 2007

History: This message has been forwarded.

Hi Bonnie,

As requested, and on behalf of Remedium, Inc., enclosed are MWH's comments to the Draft Phase I Sampling and Analysis Plan for OU 3 - Libby Asbestos Superfund Site, dated September 7, 2007. We believe the SAP is a good draft considering the limited time you had to prepare this and we look forward to working with you to improve upon this draft. We also look forward to discussing our comments with you and your contractors upon your earliest availability.

Best Regards,

-Mike

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MWH Comments on OU3 SAP.doc Recommended air sampling locations.jpg

Comments on:

Draft Phase 1 Sampling and Analysis Plan for Operable Unit 3, Libby Asbestos Superfund Site, September 7, 2007

By:

MWH AMERICAS, INC.

GLOBAL

Please change agency name to U.S. Geological **Survey** not **Service.**

Contaminants, not **Chemicals** of concern, etc. (LA is not a chemical, but a group of amphibole minerals, each with different chemistries).

Libby **D**am not **d**am.

Please replace references to **daily** database uploads to ftp site with **weekly**, per agreement during teleconference week of September 3, 2007

In this document, OU3 boundaries should be referred to as "preliminary." (See Figures 2-1 and 2-2).

Conceptual Site Model (**CSM**) not **Site Conceptual** Model. (see TOC and titles of Figures 4-1 through 4-4).

TEXT

Section 1.2, page 2: MWH Field Supervisor: John D. Garr

MWH Field QC Officer: Jeremy S. Collyard

MWH QA **Officer** (not "**Official**"): Stephanie A. Boehnke

Section 2.1, page 4: "potential" releases is more consistent with the tone of the previous paragraph and is more appropriately objective for a technical document.

Section 2.1.1, page 4: Please delete "to the northeast." "from the southeast" is sufficient, and is more clear. As written, it could mean the wind direction may be any from the SW to the NE.

Section 2.1.2, page 5: Fleetwood and Carney creeks, not Creeks.

Section 2.1.4, page 6: asbestiform, not asbestisform

Section 2.1.3, page 6. Please insert "Masters Thesis" in front of "investigation....." in the first sentence for Zinner, 1982.

Section 2.1.4, page 6: The section titled "Geologic Setting" is not very complete as there is no discussion of the site stratigraphy or structural features that normally would accompany a section with this title. The last two paragraphs of this section are very specific to the Libby Amphibole and appear out of context with the title "Geologic Setting." The reviewer suggests the use of the subheading "Libby Amphibole" for these last two paragraphs. Also please provide a reference at the end of the first paragraph of this section.

Section 2.1.4, page 6: "as well as the center" is redundant and confusing

Section 2.1.5, page 7: Most sources say mining at Rainy Creek began in **1923**, not **1925**

Section 2.1.5, page 7: Great Northern Railroad

Section 2.1.5, Page 7 : The first sentence of the second paragraph states the ore processing changed "in response to concerns over dust generation." Please provide a reference for this specific statement.

Section 3.1, page 10: "SAP citation pending" needs to be finalized

Section 3.2, page 10: dependent, not dependant

Section 3.2, page 10: First bullet. Please delete "relatively" and replace with "very" or include actual sulfate concentration range. Also please note the range of total dissolved solids (TDS) for surface water.

Please insert the following bullet:

- Surface water collected in 2001 from the upper and lower ponds along Rainy Creek did not contain any detectable concentrations of metals, total petroleum hydrocarbons, organochlorine pesticides, PCBs, or volatile organic compounds (see Table 3-3).

Section 3.2, page 11: At the end of the first paragraph, following the discussion of surface water sampling by EPA in 2001 and 2003, please note that no detectable concentrations of metals, TPH, pesticides, PCBs, or VOCs were found in surface water.

Section 3.4, page 12: **AHERA** should be defined at first use in text

Section 3.5, page 12: **s/cc** should be defined at first use in text

Section 4.2.1, page 15: First paragraph, 2nd sentence. Text states that the conceptual site model (CSM) for human receptors focuses on inhalation exposure pathways because "...the inhalation pathway is generally considered to be of much greater risk than oral or dermal pathways." Based on this rationale, potential oral and dermal exposure pathways are excluded from Figure 4-1 and from discussion in the remainder of Section 4.2.1. However, oral and dermal exposure pathways are presented in the CSM for non-human mammals (refer to Figure 4-3) and the oral pathway is described as complete and "may provide an important contribution to the total risk to the receptor". For completeness, it would be helpful to include ingestion and direct contact pathways in Figure 4-1, and state that these pathways are potentially complete but represent a minor contribution to total risk relative to the inhalation pathway.

Section 4.2.1, page 15: Under the 1st bullet – 'Recreational visitors in the forested area', hunting is described as a potential activity, but consumption of harvested wildlife contaminated with asbestos is not considered to be a potentially complete exposure pathway. This appears to be inconsistent with the ecological CSM for asbestos (Figure 4-3) which indicates that ingestion of prey items contaminated with asbestos by mammals is complete and "may provide an important contribution to the total risk to the receptor". Please explain this apparent discrepancy.

Section 4.2.1, page 16: Under the 3rd bullet – 'Recreational visitors along streams and rivers', fishing is described as a potential activity, but consumption of harvested fish contaminated with asbestos is not considered to be a potentially complete exposure pathway. This appears to be inconsistent with the ecological CSM for asbestos (Figure 4-3) which indicates that ingestion of aquatic prey items (including fish and benthic invertebrates) contaminated with asbestos by fish is complete and "may provide an important contribution to the total risk to the receptor". Please explain this apparent discrepancy.

Section 4.2.1, page 16: Last paragraph in Section 4.2.1, 2nd sentence. – Text states that "...future residential development is not reasonably anticipated in other areas of OU3." While we agree with this statement, it would be helpful to describe any zoning, permitting or other land use restrictions that would preclude future residential development in such areas.

Section 4.2.2, page 16: Text introduces the CSM for human exposure to non-asbestos chemicals, but does not describe the type or nature of such chemicals. It would be helpful to identify the types of non-asbestos chemicals that are the subject of this CSM in order to evaluate the accuracy of the indicated exposure pathways. For example, metals are generally not considered to contribute significantly to total risk by the direct contact pathway, through dermal absorption (due to low bioavailability of metals by this pathway), but soil or dust contaminated with metals may contribute significantly to total risk through the incidental ingestion pathway. Alternatively, pesticides and PCBs have the potential to bioconcentrate and biomagnify in the food-chain, and may contribute to

human exposures through consumption of harvested fish, birds or mammals. Section 4.4 indicates that metals, metalloids, pesticides and PCBs are target analytes for the sampling program and may have been used at the site. The human health and ecological CSMs should reflect all potentially relevant chemicals and exposure pathways, unless they are considered to be minor.

Section 4.2.3, page 17 ; Under the 1st bullet – 'Fish and Benthic Invertebrates', text states that fish may be exposed to asbestos in surface water, sediment and aquatic food items via ingestion. Figure 4-3 indicates that such exposures are believed to be complete and may provide an important contribution to the total risk to these receptors. What evidence is there to suggest that asbestos may pose a significant risk for fish through the ingestion pathway? This pathway would require gastrointestinal absorption of asbestos by fish. What evidence is there to suggest that asbestos is bioavailable through the oral pathway in fish? In the absence of such evidence, the ingestion pathway should be indicated as incomplete or "?" in Figure 4-3, rather than complete.

Section 4.2.3, page 17: Under the 2nd bullet – 'Terrestrial plants and soil invertebrates', text states that plants and soil invertebrates may be exposed to asbestos in soil by direct contact. Figure 4-3 indicates that such exposures are believed to be complete and may provide an important contribution to the total risk to these receptors. What evidence is there to suggest that asbestos may pose a significant risk for plants or soil invertebrates through direct contact. This pathway would require root uptake by plants and dermal uptake by soil invertebrates. What evidence is there to suggest that asbestos is bioavailable by root uptake or dermal contact? In the absence of such evidence, the direct contact pathway should be indicated as incomplete or "?" in Figure 4-3, rather than complete.

Section 4.2.3, page 17: Under the 3rd bullet – 'Mammals and birds', text states that mammals and birds may be exposed to asbestos in soils, surface water, sediment and food via ingestion. Figure 4-3 indicates that such exposures are believed to be complete and may provide an important contribution to the total risk to these receptors. What evidence is there to suggest that asbestos may pose a significant risk for mammals or birds through the ingestion pathway? This pathway would require gastrointestinal absorption of asbestos by mammals and birds. What evidence is there to suggest that asbestos is bioavailable through the oral pathway in mammals or birds? In the absence of such evidence, the ingestion pathway should be indicated as incomplete or "?" in Figure 4-3, rather than complete.

Section 4.2.4, page 17: Text introduces the CSM for human exposure to non-asbestos chemicals, but does not describe the type or nature of such chemicals. It would be helpful to identify the types of non-asbestos chemicals that are the subject of this CSM in order to evaluate the accuracy of the indicated exposure pathways. Section 4.4 indicates that metals, metalloids, pesticides and PCBs are target analytes for the sampling program and may have been used at the site. The ecological CSM for non-asbestos chemicals should reflect all potentially relevant chemicals and exposure pathways, unless they are considered to be minor.

Section 4.4.3, page 19: 1st paragraph, last bullet. Under the heading – Contaminant Concentration Data, the last bullets indicates that concentration data on asbestos and non-asbestos contaminants may be needed for aquatic and terrestrial food items (e.g., fish, invertebrates, plants, birds, small mammals). What evidence is there to suggest that asbestos poses a risk to ecological receptors through prey items and the ingestion pathway? Environmental data should only be collected for those media and contaminants that pose a potential risk to human health or the environment.

Section 4.2.1, page 15: "who engage" not "who **are** engage"

Section 4.4.3, page 19: "metalloid" not "metaloid"

Section 4.4.3, page 19: Following the second paragraph, please add the following bullet:

- Air in the vicinity of surface soil, roadway, sediment, and solid waste material

Also, for consistency purposes, please replace the reference to "Mine tailings and waste rock" with "Mine waste."

Section 4.4.3, page 20: The first paragraph states that "For the purposes of the Phase I investigation, data collection efforts will focus on aquatic receptors and small mammals." We believe it is very premature to collect these data at this time, since the site contaminants-of-concern (COCs) for OU3 have not been fully determined. In addition, none of the mine waste or surface waters and sediment, where small mammals and aquatic receptors could exist, have been characterized. A primary purpose and objective of the Phase I RI is to characterize these wastes and other media to determine the site COCs, hence the required sampling and analysis of several media for many analyses including metals, TPH, PCBS, pesticides, herbicides, VOCs, SVOCs, gross alpha and gross beta, cyanide, fluoride, etc.

Once the site COCs have been fully determined, a sampling and analysis plan can be designed to assess exposure of these COCs to aquatic receptors and small mammals. The draft SAP currently focuses solely on asbestos exposure for aquatic receptors and mammals. Should non-asbestos contaminants be detected at levels of concern during the Phase I RI, exposure of these COCs to aquatic receptors and small mammals would have to be repeated. We believe it would more prudent to delay this sampling to the Phase II RI and therefore recommend either striking this discussion from the SAP or indicating this as a planned Phase II sampling activity.

Section 4.4.4, page 20: Areas that will be investigated include source materials and current releases into ambient air. It is important to note that current remedial activities associated with the transport and landfilling of contaminated OU4 soils within OU3 may impact ambient air within OU3. In particular, front-end loaders and haul trucks driving on former mine roads and non-asphalt surfaces commonly generate visible dust that could be detected through nearby and downwind air monitoring.

Section 4.4.6, page 21: Please define "**Type 1**" and "**Type 2**" errors.

Section 4.5.5, page 22: The first sentence states "The objective of sampling surface soil and tree bark at various locations in the forest surrounding the mine is to determine if the extent of historic and current releases of airborne asbestos from the mine can be identified by examining the spatial pattern of asbestos in soil/or tree bark." The reviewer would like to know how historic releases of airborne asbestos will be differentiated from possible current releases of airborne asbestos?

Section 4.5.6, page 23: The first sentence states "The purpose of sampling ambient air for asbestos is to obtain data on the level of releases occurring from the mine area to adjacent downwind areas under current site conditions." Please note that current site conditions include impact from ongoing remedial activities associated with the transport and placement of contaminated OU4 soils within OU3, particularly in the amphitheater area and all areas above the amphitheater where contaminated material is transported and disposed. Dust generated front-end loaders and haul trucks driving on former mine roads and non-asphalt surfaces throughout the mine is of concern. This dust could be detected through air monitoring and sampling stations. Also, as indicated in this paragraph, the input needed for risk assessment purposes is an average concentration of asbestos in ambient air. The calculation of this average concentration may be significantly affected by on-going site remedial activities and therefore any calculation of this value should not be applied to any site usage scenarios.

Section 4.5.7, page 23: As described in the comment to **Section 4.4.3, Page 20,** we believe it is very premature to conduct any biota sampling at this time, and any such sampling should be deferred to the Phase II RI. Furthermore, as stated near the end of this paragraph, EPA states "it is not expected that this initial biotic sampling effort will provide definitive findings." Therefore, we would question the value and benefit of collecting these data, particularly considering the level of effort that would be required to implement such a data collection activity. We doubt these data would provide any value to design a Phase II program or support the baseline risk assessment.

Section 4.5.7, page 23: The 2nd bullet states that the purposes of sampling biota include: 1) obtain preliminary data on the community composition (density and diversity) of benthic macroinvertebrates present in Rainy Creek compared to one or more reference streams, 2) obtain preliminary data on the density and diversity of small mammals near the mine area compared to an area remote from the mine, and 3) compare asbestos tissue burden in selected organs of small mammals collected near the mined area to that observed in animals collected remote from the mined area.

In regard to comparisons of the density and diversity of benthic invertebrates and small mammals between mine areas and references sites, is the purpose of these field studies to evaluate impacts of asbestos or non-asbestos chemicals on these ecological resources? If the concern is asbestos, what evidence is there to suggest that asbestos adversely impacts benthic invertebrates or small mammals? There should be some evidence that asbestos is

capable of adversely impacting benthic invertebrates or small mammals before embarking on a costly sampling program to evaluate such impacts.

Similarly, the comparison of asbestos tissue burdens in small mammals between mine areas and areas remote from the mine implies that asbestos is bioavailable (i.e., absorbed through the gastrointestinal tract) and distributes to various internal organs through the blood stream. What evidence is there to suggest that asbestos is bioavailable through the oral pathway in small mammals? There should be some evidence that asbestos is bioavailable through the oral pathway before embarking on a costly sampling program to evaluate tissue-specific body burdens.

Section 5.0, page 24: Please note a Health & Safety Plan (HASP) will be prepared by the sampling team for use by the sampling team under contract with Remedium, Inc. and that W.R. Grace will not be preparing a HASP.

Section 5.1.1, page 24: To assist field teams in the implementation of the SAP, the reviewer suggests inserting subheadings to include "Mine Waste Rock Sampling" and "Tailing Sampling" to paragraphs two and three, respectively. These subheadings should also be added to Section 5.12.

The third paragraph on Page 25 states "Additional (tailing) sampling and analysis at depth may be necessary during Phase II to characterize older materials that are now buried under the more recent mine wastes." Following EPA's DQO process, as presented on Page 14, can EPA please provide an explanation of how this determination will be made with the data obtained and identify the types of data inputs needed to make this decision. The fourth paragraph refers to "roadway materials." Can EPA please provide further explanation as to what "roadway materials" include and what part of the road (i.e. roadway center or edge) these samples will be collected from?

Section 5.1.2, page 25: Second paragraph, please insert that each roadway sample will be a single grab sample collected from the top 6 inches. The reviewer suggests the current third paragraph be inserted after the first paragraph. Also please include the word "rock" after "mine waste" in the first and second paragraphs to avoid possible association of mine waste to tailings.

The reviewer also suggests the preparation of two new figures to show the composite sampling scheme and precise sampling locations for the fine and coarse tailings disposal areas. The current spatial description for these grids is very confusing. For sampling locations MW-4 and MW-5, within the fine tailings impoundment, portions of the composite transects coincide with areas of standing water within the impoundment. The presence of standing surface water may affect the chemical characterization of tailings at these locations. How does EPA want composite locations containing standing water sampled or not sampled?

Section 5.2.1, page 26-27: Second paragraph, third sentence, we suggest deleting the last part of that sentence so that it would read "Water quality data for springs will provide

information on shallow water quality." There is no current data to conclude the seep water will likely contain contaminants from the mine wastes, particularly considering there is no evidence of acid mine generation at OU3. This will be determined by conducting the RI.

Section 5.2.1, page 27: The 5th and 6th paragraphs in Section 5.2.1 describe targeted Phase I sampling investigations for sediment and surface water, respectively. The proposed Phase I sediment sampling will target depositional areas. The proposed Phase I surface water sampling will target the tailings impoundment and toe drain (TP and TP-Toe), and Lower Rainy Creek downstream of the confluence with Carney Creek at LRC-1. We agree with a limited, targeted sampling program in areas most likely to be impacted, before a more extensive and costly sampling program is implemented.

Section 5.2.2, page 28: Second paragraph, reference is made to both filtered and unfiltered samples. Can EPA please insert "for metals" after the word "collected" in the first sentence assuming filtered analyses are restricted to metal analyses.

Section 5.2.3, page 29: Under the section titled "Sediment Sampling for Toxicity Testing," can EPA please specify where samples for TIE testing will be physically collected from the tailings impoundment and mill pound and confirm whether 5 gallons of sediment is required to be collected. For the tailings impoundment, is one or two 5 gallon samples required?

Section 5.2.3, page 29: Under the heading – Sediment Sampling for Toxicity Testing, text states that samples of sediment for toxicity testing will be collected only from the tailings impoundment and mill pond during the Phase I investigation. We concur with this targeted sampling approach, to evaluate whether mining activities have adversely impacted sediment in potentially "worst-case" locations before performing more extensive sediment toxicity testing.

Section 5.2.3, page 29: Under the heading – Sediment Sampling for Toxicity Testing, 3rd sentence. Replace "as" with "an".

Section 5.2.3, page 29: **an** assessment not **as** assessment

Section 5.2.3, page 29: **R**ainy Creek, not **r**ainy Creek

Section 5.2.4, page 30: Please make spelling of **gage** and **gauge** consistent

Section 5.2.4, page 33: Based on field observations and tests of sampling procedures by MWH during site visits on September 11 and 12, 2007, the sampling scheme in the draft SAP is problematic.

1. A 20-foot-square soil sampling grid will be too large for use at most tree bark/soil locations and will likely result in collection of soil samples affected by bark shed from neighboring trees. Also, if the soil sampling grid were centered on the tree from which

the bark sample is to be collected, the center sample of the proposed five-sample composite would be beneath the tree itself. MWH recommends that the five composite soil samples be collected at an approximate five-foot radius from the tree selected for bark sampling. The samples will be collected from five equally-spaced locations around the circumference at a five-foot radius from the tree.

2. At most soil/tree bark sampling locations visited by MWH, the upper two inches of the mineral soil horizon beneath the forest floor litter ("duff") is rocky, thin, and contains abundant roots and rootlets. It may be impractical to collect 2 kg of soil from the upper two inches of the mineral soil horizon. MWH recommends that the target quantity of soil to be collected at each tree bark/soil sampling location be 400 to 500 mgs (roughly one pound).

Section 5.2.4, page 33: According to USFS foresters and other tree experts, an entire thickness of bark on a Douglas fir is shed over a period of between one and five years. Given this shedding rate, there are no trees with bark older than five years, and thus, although there are many trees that existed during the period of mine operation (1923 through 1990), even at the most conservative shedding rate, the trees have shed more than three full thicknesses of bark since mine operations ceased in 1990. Thus, the amphibole fibers in tree bark sampled this fall will not be reflective of active mine operations, only of amphiboles carried by air over at most the past five years (e.g., from wind erosion of exposed amphibole from the inactive mine site, and from disturbance of materials placed at the mine site as part of remedial action at OU4).

Because amphibole fibers are captured only on the outermost surface of a tree's bark, which has a maximum age (and maximum possible exposure to airborne amphibole fibers) of five years, the age of the tree from which a bark sample is collected is of limited value. USFS foresters believe the eight-inch minimum diameter requirement will ensure that the tree is at least 50 years old. For these reasons, and in the interest of time and resources, MWH suggests that the circumference of each sampled tree be measured and recorded, but that the requirement to obtain an incremental bore sample from each tree be waived, or at a minimum, reduced to a percentage (e.g., 10 percent) of the trees from which bark samples are collected.

Section 5.5, page 33-34: As stated on Page 23, we understand "the purpose of sampling ambient air for asbestos is to obtain data on level of releases occurring from the mine area to adjacent downwind areas under current site conditions". We also understand, as stated on Page 34, that "sampling stations should be sufficiently far from access roads or trails that dust from vehicular traffic (trucks, ATVs, etc.) used to access the stations does impact the samplers."

In addition to vehicles used to periodically access the ambient air stations, we are very and more concerned about potential impacts from dust that is currently being generated by OU4 remedial actions. Not only is there the potential for dust generation associated with the transport, unloading, reloading, transport, unloading, and placement of contaminated OU4 soils within OU3, but haul truck traffic on mine roads above the

amphitheater is also generating visible dust. Heavy haul trucks and front-end loaders are currently moving this material throughout the day as a continuous operation. Any air sampling station located near these activities would be expected to record these activities, just as it does in the amphitheater area (see data for workers in Rainy Creek Road in Table 3-6).

Currently, ambient air data are planned to be collected for approximately four weeks (four 5-day collection periods). Unless OU4 remedial activities within OU3 are stopped during this collection period, any ambient air data that are collected will be suspect, and it may be difficult to impossible to account for particulate contributions that are attributable to OU4 remedial activities. Figure 5-4 shows the locations of the planned eight sampling stations. Station A-7 appears to be located within 100 feet of Rainy Creek Road and could be impacted by haul truck traffic on that road. Station A-1 appears to be located along the Jackson Creek Road near the locked gate that enters the upper portion of the Rainy Creek Road. This location could be impacted by vehicles generating dust from driving along to the top of the Jackson Creek Road where a pack trail begins. This area could be highly used during the upcoming deer and elk hunting season which coincides with the schedule for the planned air sampling. Station A-2 is located approximately 1,000 feet immediately downwind from haul truck traffic along the unpaved portion of the Rainy Creek Road. Station A-4 is downwind from the amphitheater area. Station A-5 is immediately adjacent to haul truck traffic on the unpaved portion of the Rainy Creek Road and downwind from the area where OU4 soils are placed and graded. Stations A-3 and A-6 appear to be located in areas not impacted by site activities and therefore appear adequate to measure ambient conditions. Please see attached Figure, which depicts our recommended air sampling locations.

Also please note the wind rose pattern shown on Figure 5-4 differs from the wind rose pattern shown on Figure 2-3. It is not clear which wind rose pattern was used to develop the sampling transects on Figure 5-3 and select the stations on Figure 5-4.

Section 5.5.2, page 34: Please delete reference to high flow rates and large flow volumes in the second paragraph as ambient air sampling will be conducted using low-flow (2 L/min) as stated in the first paragraph. In the fourth paragraph, please insert text indicating that monitors will be checked at least once every 24 hours and delete reference to checking at the mid-point (3 day).

Section 5.6.1, page 34: As previously mentioned, we believe it is very premature to conduct any biota sampling at this time, until the site COCs have been determined. Therefore, we suggest EPA please consider inserting "during Phase II RI sampling" after "evaluated" in the first sentence and at the beginning of the second paragraph.

Section 5.8, page 37: The sample ID designation described (P1-xxxxx) is a function of database classification. It would be a hardship on the field sampling teams to label samples with the sample ID in addition to the sample location ID. As long as samples are properly labeled with location information (e.g. MW-1, etc) there is no reason that the sample ID could not be attached at the time of data entry or database upload.

Normally, concealing sample type from the laboratory is not necessary except for blind field replicate/duplicate samples.

Section 5.6.1, page 34: Under the heading – Aquatic Receptors, 1st paragraph, 1st sentence, text states that effects of mining-related contamination on aquatic organisms will be evaluated, in part, based on "...the measurement of toxicity of site surface water and/or sediments to aquatic organisms in either field or laboratory tests". Where is surface water toxicity testing described in the Draft SAP?

Section 5.6.1, page 35: Under the heading – Aquatic Receptors, 2nd paragraph, text states that sampling of aquatic organisms will be performed at the surface water and sediment sampling locations shown in Figure 5-5. Figure 5-5 identifies nine aquatic sampling locations, and the aquatic biota sampling parameters for each location are shown in Table 5-6. These parameters include benthic invertebrate community identification for seven of the nine locations, and sediment toxicity testing for all nine aquatic sampling locations. However, text in Section 5.2.3 states that samples of sediment for toxicity testing will be collected only from the tailings impoundment and mill pond during the Phase I investigation. Please clarify the scope of the Phase I sampling investigation for aquatic organisms.

Section 5.6.1, page 35: Under the heading – Terrestrial Receptors, text states that sampling of ground-dwelling mammals (mice, shrews and voles) will be performed at one downwind location (SMT-1) and one cross-wind location (SMT-2). Up to five animals of each species (up to 15 animals) will be collected from each area for measurement of tissue burden of asbestos. Counting the downwind and reference areas, up to a total of 30 animals may be collected and analyzed for measurement of tissue burden of asbestos. As indicated in Section 6.3 – Analysis of Biotic Samples, a minimum of three tissues (e.g., lung, gastrointestinal tract, kidney) will be prepared and analyzed for LA fibers. Presumably, more tissues will be analyzed to evaluate whether asbestos is absorbed and potentially toxic to small mammals through the ingestion pathway. Thus, up to 150, or more, individual tissue samples will be prepared and analyzed for LA fibers. Given the large number of samples that are proposed for tissue burden analysis, and because it is unknown whether or not asbestos is bioavailable via the ingestion pathway, we recommend that fewer small mammal samples be collected, prepared, and analyzed; or a phased approach be used for small mammal sampling and analysis. A phased approach could include holding the reference location (SMT-2) samples for tissue burden preparation and analysis until results for samples collected from the downwind location (SMT-1) confirm that asbestos is bioavailable through the ingestion pathway.

Section 6.3, page 46: Text in the 1st sentence states that the small mammal sampling SOP is "in preparation". Yet, the small mammal sampling SOP is included as SOP #Mammal-Libby-OU3 Small Mammal Collection. Please correct this statement.

Text in the 2nd sentence states that selected tissues (e.g., lung, gastrointestinal tract, kidney) will be prepared and analyzed for LA fibers. Presumably, more internal tissues

will be analyzed to evaluate whether asbestos is absorbed and potentially toxic to small mammals through the ingestion pathway. Please be more specific in regard to the specific types of small mammal tissues that will be prepared and analzed for asbestos tissue burden.

Section 7.1.1, page 49: It is unclear in this paragraph what constitutes an air "sampling event," thus, the required number of air sample field blanks is unclear. Further, it is unclear what information will be provided from air sample field blanks that will not be provided by the lot blanks; the only difference between the lot and the field blanks is that the field blank cassette will be opened.

Section 7.1.1, page 49: Industry practice is to collect field blanks at one per sampling team per day to meet project data quality goals.

Section 7.1.3, page 51: It is unclear how and by whom performance evaluation (PE) samples will be prepared. If the samples are to be fully prepared and provided by QATS and the USGS, this should be clearly stated. PE samples for Phase 1 would be hard to incorporate in with the field samples in the short time available. The analytical laboratories should have been chosen with sufficient qualifications to make the need for PE samples within the sampling events unnecessary.

Section 7.4.6, page 55: Continuing calibration verifications (CCVs) are check samples required at frequencies specified in each analytical method.

Section 7.5.1, page 56:

The RPD % = (|2 (S-D)|x100)/(S+D) equation submitted is incorrect and should be corrected to:

%RPD = (|S-D|/(S+D)/2) x 100 as per Method SW846 8000B

Field precision is assessed through the collection and measurement of field duplicates...Because the variability between field duplicates is random and may be either small or large, there is no quantitative requirement for the agreement of field duplicates.

Comment:
Field precision is assessed through the collection and measurement of field duplicate/replicate samples. There is no quantitative requirement for the agreement of field duplicates; however guidance QC limits may be established to meet project data quality objectives.

Precision in the laboratory is assessed through the calculation RPDs for duplicate analyses or relative standard deviations (RSDs) for three or more replicate analyses of the same sample.....Based on this, an RPD/RSD of 50 percent for mine waste, soil, sediment field duplicate samples and 25% for water field duplicates will be used as advisory limits

Comment:
Precision in the laboratory is assessed through the calculation of RPDs for duplicate/replicate analyses...Based on this, RPDs of 50% for mine waste, soil, sediment field replicate samples and RPDs of 25% for water field duplicates will be used as advisory limits

Section 7.5.2, page 57:

The accuracy required for data usability depends on a number of factors. In general, good accuracy is most important for samples whose concentration values are close to the level of concern, and a somewhat lesser level of accuracy may be acceptable for samples whose concentrations are either well below or well above a level of concern. Based on this the goal for Phase 1 is to achieve analytical accuracy of ± 25% for analytes that are within a factor of 10 of initial estimates of the level of concern, and ± 50% for samples either 10-fold above or 10-fold below initial estimates of the level of concern.

Comment:
Accuracy is the degree of agreement of a measurement or an average of measurements with an accepted reference or "true" value, and is a measure of bias in the system. The accuracy of a measurement system is affected by errors introduced through the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analytical techniques

Section 8.2.1, page 59: Weekly uploads of field data to an ftp site were agreed upon during a teleconference between WR Grace, MWH, EPA and their contractors the on September 7, 2007. This section of the SAP specifies daily data transfer. The coordination of all field teams to provide the day's data (copy and scan logbooks, scan field forms, transfer and name photographs, etc.) for daily loading into the project database would be a significant burden.

MWH suggests that the requirement for data transfer be weekly, or more frequently, as conditions permit. This will allow field teams to focus on performing the field activities correctly and safely and will allow the on-site data manager to accomplish careful data management and data transfer as time permits. Rushing to transfer field data at the end of each field day will increase the probability that incorrect or incomplete data will be transferred.

General Comments: During MWH's visit to the site the week of September 10, 2007 it was observed that transfer operations at the "Amphitheater" (where trucks hauling soil from remedial action at OU4 dump their loads, which are transferred by front-end loader into site-dedicated trucks for transport up the mountain) are often very dusty. In one instance, large clouds of dust were observed to move down the Rainy Creek drainage during loading/unloading operations. Dust clouds such as those observed may result in airborne migration of contaminated materials from OU4 to the air, surface water and

surface soils in the vicinity of the Amphitheater, and may effect analytical results of media collected as part of Phase 1 activities.

Another observation that concerns MWH is that water used to decontaminate vehicles at the Amphitheater area is taken from the "Freshwater Pond" adjacent to the vehicle decontamination rack/tray. Although this water is passed through 20 um and 5 um filters prior to being used to rinse vehicles, the rinsate returns to the Freshwater Pond. The water in this closed-loop rinsewater system is likely to become enriched in amphibole fibers less than 5 um in size.

Table 3-2 indicates that 7,459 s/ml were detected in the Rainy Creek (lower reach) catch basin in samples collected in 2001. It is not clear whether this catch basin is the same as the "Mill Pond," "Lower Pond," or the "Freshwater Pond."

MWH located two former production wells within a reasonable distance from the Amphitheater operations that may be a source of cleaner (free of asbestos) water for decontamination of vehicles. MWH recommends that the feasibility of using one or both of these wells be evaluated. If groundwater can be used for decontamination, the rinsate could perhaps be discharged to the tailings pond, and not recycled.

Given the limited time remaining in the 2007 field season, MWH believes Phase 1 activities should focus on the contaminants of concern and the area of the study. Proper sampling and analysis of biota can only be performed after the concentrations and extent of contaminants are known, and thus, biota sampling should be deferred to a later phase of study.

TABLES

Table 3-1: Editorial comments, fourth column, change references to "1 samples were" to "1 sample was" for Rainy Creek and Hwy. 37 lines.

Tables 5-7 and 5-8: Please revise Extraction/Holding Times Column header to Extraction/Analysis Holding Times

Table 6-1: Please eliminate the Target MDL/MDL Goal column. Laboratories should provide MDLs prior to sample analysis.

Tables 6-2 and 6-6: Please eliminate the Field Measurement requirements from the analytical requirements table or clarify their presence with a header to the effect of Field Instrument Stability Requirements prior to sampling.

Please eliminate the Target MDL/MDL Goal column. Laboratories should provide MDLs prior to sample analysis.

SW846 6000/7000 series methods are suitable for water matrix and may be used in place of the less commonly used EPA 200 series methods.

Table 6-3: Please eliminate the Field Measurement requirements from the analytical requirements table or clarify their presence with a header to the effect of Field Instrument Stability Requirements prior to sampling.

Please eliminate the Target MDL/MDL Goal column. Laboratories should provide MDLs prior to sample analysis.

Tables 6-4 and 6-5: Please eliminate the Target MDL/MDL Goal column. Laboratories should provide MDLs prior to sample analysis.

Please provide required parameter list and target PQLs for Methods 8141, 8151A, 8260B, 8270C. While references to CLP methods should be listed in the associated footnotes, the tables would be more complete with a defined listing of parameters and PQLs.

Table 7-1: Field Blank requirement for Solid Media is not required per Section 7.1 text.

Trip Blank requirements for both Water and Solid Media should match the text: One trip blank per cooler containing samples designated for VOCs analyses.

Equipment Rinsate Blank for Water does not match the text and should be 1 per sampling team per day.

Acceptance criteria for Field, Trip, and Equipment Rinsate blanks should be <PQL for all target analytes.

Table 7-2: There appear to be several errors in Table 7-2. Rather than commenting on each one separately, MWH has resubmitted Table 7-2 and it is attached to these comments.

FIGURES

Figures 2-1, 2-2, 2-4,3-1, 3-2, 3-3, 3-4, 3-5, 5-2, 5-3, 5-5

Please show aerial photo layer as background for all of these photos as is shown in all other figures as this is very helpful to guide field teams with sample locations. The aerial background is also much more useful for identifying site features and disturbed mine areas, as well as roads for reference. We also suggest that each Figure be provided as an 11" by 17" Figure for the final SAP. Figure 2-3, the wind rose pattern in this figure does not match the wind rose shown in Figure 5-4. Please resolve this discrepancy.

SOPs

Standard Operating Procedures

Please delete reference to "FMC" Corporation on all SOPs. MWH provided these SOPs to EPA to represent example SOPs that are commonly used by MWH. We realize the need to tailor SOPs to a given project and specific site conditions and therefore request that reference to FMC be deleted from the final SAP.

SOP # Mammal-Libby-OU3 Small Mammal Collection:

Method Summary, 1st sentence, page 3. Text states that small mammals (including mice, voles and shrews) will be collected using Sherman Live traps. Sherman Live traps are available in different sizes for different mammals. In our experience, only the smallest Sherman Live traps will prevent smaller sized mice and voles from escaping through cracks in the trap. Please make sure to select the appropriate trap size for these species.

SOP #9- Section 4.2 Field Sample Data Sheet Forms:

Data regarding each sample collected as part of the OU3 Phase I sampling will be documented using Libby-specific FSDS forms. These forms are media-specific and designed to facilitate data entry of station location, sample details, and field measurements needed for the OU3 Phase I investigation.

Comment:
While it may have been the intent to facilitate data entry by using the FSDS forms, the use of these forms as presented will not accomplish this goal. The forms are repetitive and redundant both within themselves (e.g. SWS1/GW1) and with other field sampling forms presented (e.g. SWS1/Surface Water Sampling Record SOP#3). Data entry as well as field team sampling documentation will be more time-consuming than necessary.

A properly designed database should be able to pull the information required from various tables populated from a minimum of forms, clearly separating all required information vs. any helpful additional comments. We recommend the use of more streamlined forms; unnecessary and redundant paperwork will not add value to the data collected and will decrease the efficiency of RI activities.

SOP #9- Section 5.0 Field Data Transmittal:

Copies of all FSDS forms, COC forms, and field log books will be scanned and posted in (PDF) form to a project-specific (FTP) site daily.

Comment:
Copies of all FSDS forms, COC forms, and field log books will be scanned and posted in PDF form to a project-specific FTP site weekly.

SOP AMB-LIBBY-OU3: Collection of Outdoor Ambient Air Samples:

Section 3.0, Page 2: Sampling Pump: Please remove " rotary vane pump with locking flow valve such as a Gast Model 1532 or equivalent." Pump Housings: Replace with "weatherproof enclosure to house pump and batteries." Please remove "power cords." Stands: Please replace "telescoping tripods designed specifically" with "metal fenceposts."

Section 4.1, page 3: Please remove second paragraph.

Section 4.2.1, page 3: Please remove second sentence in Section 4.2.1. Please replace "Dry-Cal(DC)-Lite" with "primary flow standard."

Section 4.2.2, page 4: : #5. Adjust the sampling pump until the middle of the float ball on the rotameter is lined up with the pre-calibrated flow rate value. Please omit item #'s 6,7,8.

Section 4.2.3, page 5: Flow checks will be performed daily. Please omit the second sentence.

Section 4.3.2, page 6: Items #2 and #7 are not needed.

Section 4.6.1, page 7: Please omit the second sentence.

Table 7-2. Summary of Laboratory Qualifty Control Measures, by Analysis

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
ICP Metals SW-846 6010B (and EPA 200.7 for aqueous samples)	Initial calibration (1 point + blank minimum)	Daily prior to analysis	Correlation coefficient (r) ≥0.995	• Recalibrate
	Interference check standard (ICS)	Beginning and end of each analytical run	Results +/- 20% of true value	• Terminate analysis • Recalibrate instrument • Reanalyze all samples back to last acceptable ICS
	Initial calibration verification (ICV)	After calibration, prior to sample analysis	Results <10% from calibration standard	• Reanalyze ICV • Recalibrate, if ICV still out
	Continuing calibration verification (CCV)	Every 10 samples and end of analytical sequence	Results < 10% from calibration standard	• Reanalyze affected samples back to the last acceptable CCV
	Calibration blank - Initial calibration blank (ICB), Continuing calibration blank (CCB)	After initial calibration verification, each subsequent calibration verification, and at the end of the run	<3x the Method detection limit (MDL)	• Reanalyze blank • Clean system • Reanalyze all samples back to last acceptable blank
	Method blank	1 per preparation batch (≤20 samples)	< Reporting limit	• Reanalyze method blank. • If fails, analyze a calibration blank • Reprep/reanalyze analytical batch as appropriate
	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery +/-25% of actual value	• Assess data (4 x rule) • If LCS recoveries are within acceptance criteria, then matrix interference may be suspected • Reanalyze reprep once if matrix is not a factor • Narrate all outliers
	Matrix spike duplicate (MSD)	1 per preparation batch (≤20 samples)	RPD <20%	• Same as MS.
	Laboratory Control Sample (LCS)	1 per preparation batch (≤20 samples)	% Recovery +/- 20% of actual value	• Reanalyze LCS • Reprep/reanalyze LCS and affected samples • Narrate all outliers
ICP-MS Metals SW-846 6020 (and EPA 200.8 for aqueous samples)	Mass calibration and resolution check (4 replicates)	Daily prior to analysis	Mass calibration < 0.1 amu; resolution <0.9 amu at 10% peak height; RSD <5%	• Recalibrate
	Initial multipoint calibration (1 point + blank minimum); average of 3 integrations	Daily prior to analysis	None	• None
	Initial calibration verification (ICV); mid-level standard second source	After calibration, prior to sample analysis	± 10% from true value	• Reanalyze ICV • Recalibrate, if ICV still out
	Continuing calibration verification (CCV)	Every 10 samples and end of run sequence	± 10% from true value	• Reanalyze affected samples back to the last acceptable CCV

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
ICP-MS Metals SW-846 6020 (and EPA 200.8 for aqueous samples)	Interference check solution	At beginning of analytical sequence or once every 12 hours, whichever is more frequent	Recoveries +/- 20% of theoretical value	• Internal QC review only; flag data to indicate interference
	Internal Standards	Every CCV, ICB/CCB	Recoveries +/- 20% of initial calibration	• Recalibrate and verify calibration • Reanalyze affected samples
		Every sample	Recoveries 30-120% for samples	• Dilute sample 5x and reanalyze • Repeat until within limits
	Calibration blank Initial calibration blank (ICB) Continuing calibration blank (CCB)	After initial calibration and each subsequent calibration verification	< 3 x Method detection limit (MDL)	• Reanalyze blank • Clean system if still out • Reanalyze affected samples back to the last acceptable CCB
	Method blank	1 per preparation batch (≤ 20 samples)	< Reporting limit	• Reanalyze method blank. • If fails, analyze a calibration blank • Reprep/reanalyze analytical batch as appropriate
	Matrix spike (MS)	1 per preparation batch (≤ 20 samples)	% Recovery +/- 25% of true value	• Assess data • Reanalyze MS if matrix is not a factor
	Matrix spike duplicate (MSD) or Matrix duplicate (MD)	1 per preparation batch (≤ 20 samples)	RPD < 20% (for values > 100 x MDL)	• Same as MS
	Post-digestion spike addition	As necessary to assess matrix interference	% Recovery +/- 25% of actual value	• Perform dilution test • Or, perform method of standard addition
	Dilution test	1 per 20 samples	% Recovery +/- 10% of true value	• Use method of standards addition
	Laboratory control sample (LCS)	1 per preparation batch (≤ 0 samples)	%Recovery within +/- 20% of true value	• Reanalyze LCS • Reprep/reanalyze LCS and affected samples • Narrate all outliers
Mercury SW-846 7470A/7471A	Initial multipoint calibration (3 point + blank minimum)	Daily, prior to analysis	Correlation coefficient (r) ≤0.995	• Recalibrate
	Initial calibration verification (ICV): mid-level standard	After calibration, prior to sample analysis	± 20% of true value	• Reanalyze ICV • Rerun initial calibration
	Continuing calibration verification (CCV): mid-level standard	Every 10 samples and at end of analytical sequence	± 20% of true value	• Reanalyze affected samples back to last acceptable CCV
	Calibration blank (ICB/CCB)	After calibration, and after each subsequent calibration verification	< Reporting limit	• Reanalyze blank • Clean system if still out • Reanalyze affected samples back to last acceptable CCB
	Method blank	1 per preparation batch (≤20 samples)	< Reporting limit	• Reanalyze method blank. • If fails, analyze a calibration blank • Reprep/reanalyze analytical batch as appropriate

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
Mercury SW-846 7470A/7471A	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery +/- 25% of true value	• If LCS recoveries are within acceptance criteria, matrix interference may be suspected • Reprep/reanalyze once if problem cannot be attributed to matrix • Narrate all outliers
	Matrix spike duplicate (MSD)	1 per preparation batch (≤20 samples)	RPD < 20%	• Same as MS
	Laboratory control samples (LCS)	1 per preparation batch (≤20 samples)	%Recovery within +/- 20% of true value	• Reanalyze LCS • Reprep/reanalyze LCS and affected samples • Narrate all outliers
SW-846, 8260B Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Tune instrument with a 4-bromofluorobenzene standard (BFB)	Every 12 hours	Must meet key ions and ion abundance criteria established by method.	
	Initial multi-point calibration; 5 point minimum. Lowest point at or below PQL. Includes calibration check compounds (CCC) and system performance check compounds (SPCC), and Internal Standards Compounds (IS).	Prior to analysis, and as required	RSD< 30 % for CCC; Average RF ≥ 0.1 for SPCC (≥0.3 for chlorobenzene, 1,1,2,2-Tetrachloroethane) If % RSD < 15% average RF may be used; linear calibration required	• Evaluate system • Repeat calibration
	Continuing calibration verification (CCV): CCC, SPCC, and IS	Every 12 hours	Percent difference <20% for CCC; RF ≥0.1 for SPCC (≥0.3 for chlorobenzene and 1,1,2,2-Tetrachloroethane).	• Evaluate system/standard • Reanalyze calibration check standard • Repeat initial calibration
	IS	Every sample, method blank, LCS, MS/MSD	Retention time for each internal standard must be within 30 seconds of most recent CCV and the EICP area for all internal standards must be within -50% to +100% of the most recent CCV.	• Evaluate system • Reanalyze sample once • Re-extract/reanalyze sample once • If due to media interference report both sets of data • Narrate all outliers
	Method blank	1 per preparation batch (≤20 samples)	< Reporting limit	• Reanalyze method blank • Reanalyze batch
	Internal standards	Every sample, method blank, LCS, and MS/MSD	Retention time for each internal standard must be within 30 seconds of most recent CCV and the EICP area for all internal standards must be within -50% to +100% of the most recent CCV	• Evaluate system/standard • Reanalyze samples • If still out, report both sets of data • Narrate all outliers

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846, 8260B Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Surrogate spike	Every sample, method blank, LCS, MS/MSD	No more than one surrogate outside QC acceptance criteria. No surrogate below 10% recovery.	• Reanalyze sample once • Re-extract and reanalyze if >1 surrogate outside QC acceptance limits • If still out, report both sets of data • Narrate all outliers
	Matrix spike (MS)	1 per preparation batch (≤20 samples)	Percent recovery within QC acceptance criteria (Attachment X)	• Assess data (4x rule) • If LCS and surrogate recoveries are within acceptance criteria matrix interferences may be suspected • Reprep/reanalyze once if matrix is not a factor • Narrate all outliers
	Matrix spike duplicate (MSD) or Matrix Duplicate (MD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within QC acceptance criteria (Attachment X)	• Same as MS
	Laboratory control sample (LCS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze LCS • Reprep/reanalyze LCS and all associated samples • Narrate all outliers
SW-846 8270C Semi-Volatiles by GC/MS	Tune the instrument using a decafluorotriphenylphosine (DFTPP) standard	Every 12 hours	Must meet the ion abundance criteria specified in the Degradation of DDT ≤ 20% Benzidine and PCP present at normal response without excessive tailing	• Retune instrument • Repeat standard analysis • Perform injection port, column maintenance as necessary
	Initial calibration (5 point minimum): includes Calibration Check Compounds (CCC), System Performance Calibration Check (SPCC), and Internal Standard Compounds (IS)	Prior to analysis and as required	% RSD for CCC ≤30%; average RF ≥0.05 for SPCC If % RSD ≤15 % average RF may be used; linear calibration required	• Evaluate the system • Repeat calibration
	Continuing calibration verification (CCV): includes CCC, SPCC, and IS	Every 12 hours	CCV percent difference for CCC ≤30%: RF ≥0.05 for SPCC EICP area of each internal standard -50% to +100% of all IS areas in most recent CCV. Retention time for each internal standard must be within 30 seconds of most recent CCV	• Evaluate system/standard • Reanalyze calibration check standard • Repeat the initial calibration as necessary
	Method blank	1 per preparation batch (≤20 samples)	<Reporting limit	• Reanalyze blank • Reprep/reanalyze blank and all associated samples

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8270C Semi-Volatiles by GC/MS	Internal Standard	Every sample, method blank, LCS and MS/MSD	The EICP area for all internal standards must be within -50% and +100% of most recent CCV Retention time for each internal standard must be within 30 seconds of most recent CCV	• Evaluate system/standard • Reanalyze the sample • If still out, report both sets of data
	Surrogate spike	Every sample, method blank, LCS and MS/MSD	No more than one surrogate per fraction outside of acceptance criteria (Refer to Table B1-a) No surrogate below 10% recovery	• Reanalyze sample once • Re-extract and reanalyze if >1 surrogate per fraction outside acceptance limits • Narrate all outliers
	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Assess data (4x rule) • Reanalyze once; if matrix is not a factor • If LCS and surrogate recoveries are within acceptance criteria matrix interference maybe suspected • Narrate all outliers
	Matrix spike duplicate (MSD) or Matrix Duplicate (MD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within QC acceptance criteria (Attachment X)	• Same as MS
	Laboratory control sample	1 per preparation batch (≤20 samples)	% Recovery within project QC acceptance criteria for all spiked analytes (Attachment X)	• Reanalyze LCS • Re-prep/reanalyze LCS and all associated samples • Narrate all outliers
SW-846 8082 Polychlorinated biphenyls (PCBs) by Gas Chromatography	Initial calibration (5 point minimum) Lowest standard at or below PQL; Expected Aroclors or Aroclor 1016/1260 five-point if unknown with single-point mid-level standards for other Aroclors for pattern recognition and retention times, or	Prior to analysis and as required	RSD <20%, average calibration factor or response factor(a) may be used; linear calibration required	• Evaluate the system • Repeat initial calibration
	Initial calibration verification (ICV) Mid level standard Expected Aroclors or Aroclor 1016/1260 if unknown	Prior to each 12 hour shift	% Difference ≤15% of expected concentration compared to response from ICAL	• Evaluate system/standard • Reanalyze ICV standard • Repeat initial calibration
	Continuing calibration verification (CCV) Mid level standard Expected Aroclors or Aroclor 1016/1260 if unknown	After every 20 samples and at the end of the analytical sequence	% Difference ≤15% of expected concentration compared to response from ICAL for each bracketing standard	• Evaluate system/standard • Reanalyze CCV and samples back to last acceptable CCV
	Retention time windows	Established with each new column installation Updated with each daily initial calibration standard	Retention times must be within retention time window established by the daily initial calibration standard Every CCV and every sample	• Evaluate system/standard; pattern recognition may be sufficient • Reanalyze CCV/affected samples

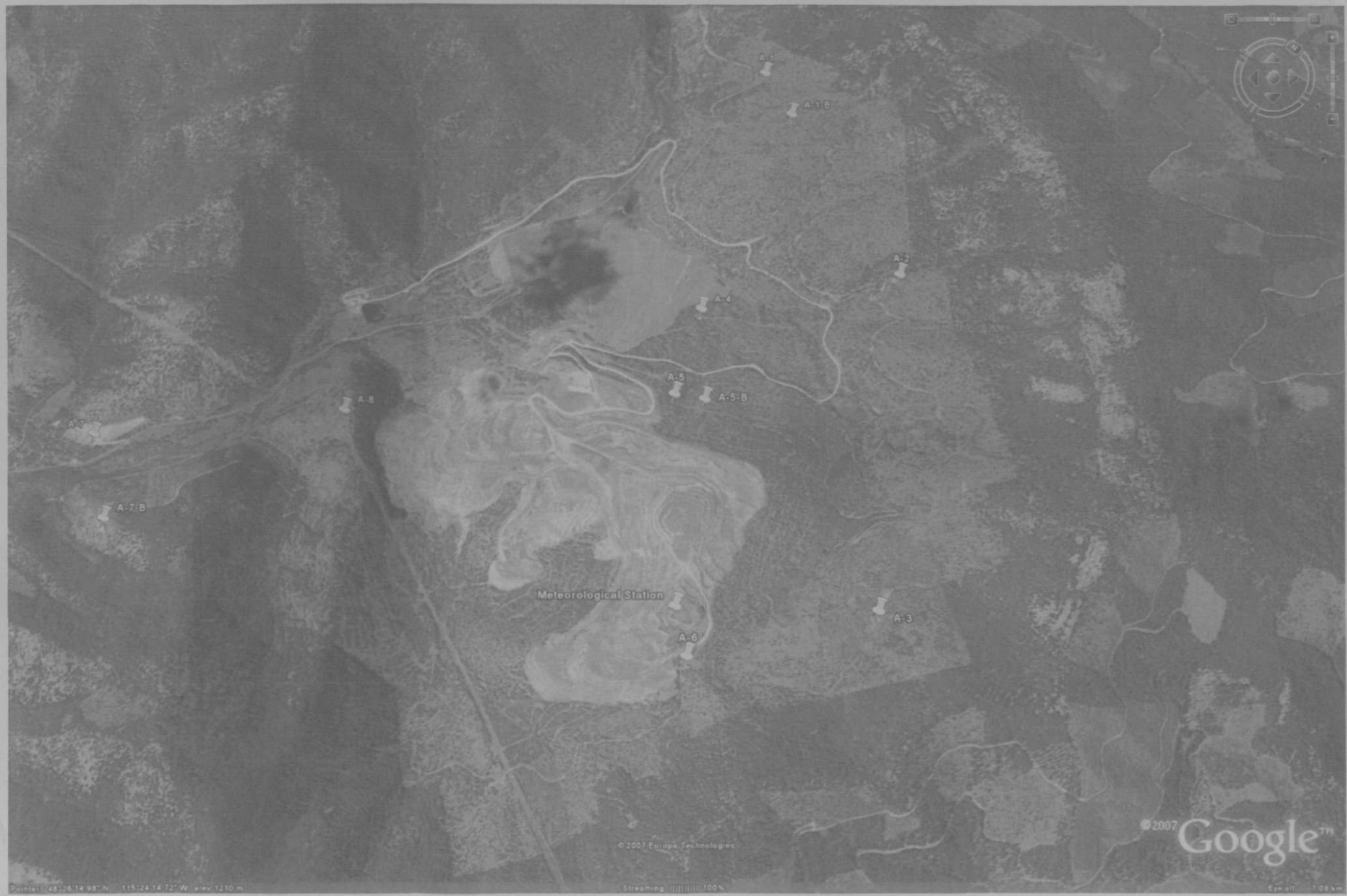
Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8082 Polychlorinated biphenyls (PCBs) by Gas Chromatography	Method Blank	1 per preparation batch (≤20 samples)	<Reporting limit	• Reanalyze blank • Re-prep/reanalyze blank and associated samples
	Surrogate spike DCB (for Aroclors) TCMX (for PCB congeners)	Every sample, method blank, LCS and MS/MSD	% Recovery within QC acceptance criteria (Attachment X)	• Re-extract/reanalyze once • If still out, report both sets of data Narrate all outliers
	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within QCacceptance criteria (Attachment X)	• Assess data (4x rule) • If LCS and surrogate recoveries are within acceptance criteria matrix interference maybe suspected • Re-extract/reanalyze if matrix is not a factor • Narrate all outliers
	Matrix spike duplicate(MSD) or Matrix duplicate (MD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within QC acceptance criteria (Attachment X)	• Same as MS
	Laboratory control sample(LCS)	1 per preparation batch (≤20 samples)	% Recovery within project QC acceptance criteria (Attachment X)	• Reanalyze LCS • Re-prep/reanalyze LCS and all associated samples • Narrate all outliers
SW-846 8081A Organochlorine Pesticides by Gas Chromatography	Column Evaluation Mix	Prior to analysis, both initial and daily	Degradation of DDT and Endrin < 15%	• Evaluate the system • Repeat standard
	Initial calibration (5 point minimum) Lowest at or below PQL Mid level multi-component standards for pattern recognition and retention times	Prior to analysis and as required	RSD < 20%, average CF may be used; linear calibration required	• Average RSD <20% across all analytes may be used if any analyte fails • Evaluate the system • Repeat initial calibration
	Initial calibration verification (ICV) Mid level standard Expected multi-component compounds	Prior to each 12 hour shift	% Difference ≤15% of expected concentration compared to response from ICAL	• Average % difference ≤15% across all analytes may be used if any analyte fails • Evaluate system/standard • Reanalyze ICV standard • Repeat initial calibration
	Continuing calibration verification (CCV) Mid level standard Expected multi-component compounds	After every 20 samples and at the end of the analytical sequence	% Difference ≤15% of expected concentration compared to response from ICAL for each bracketing standard	• Average % difference ≤15% across all analytes may be used if any analyte fails • Evaluate system/standard • Reanalyze CCV and affected samples • For CCV with response > initial calibration response and % difference >15%. samples need not be reanalyzed if no target compounds are detected

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8081 Organochlorine Pesticides by Gas Chromatography	Retention time windows	Established with each new column installation Updated with each daily initial calibration standard	Retention times must be within retention time window established by the daily initial calibration standard Every CCV and every sample	• Evaluate system/standard; pattern recognition may be sufficient for multi-component compounds only • Reanalyze CCV/affected samples
	Method Blank	1 per preparation batch (≤ 20 samples)	<Reporting limit	• Reanalyze blank • Re-prep/reanalyze blank and associated samples
	Surrogate spike DCB and TCMX	Every sample, method blank, LCS and MS/MSD	% Recovery within QC acceptance criteria (Attachment X). One surrogate must fall within established control limits	• Re-extract/reanalyze once • If still out, report both sets of data • Narrate all outliers
	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Assess data (4 x rule) • If LCS and surrogate recoveries are within acceptance criteria, matrix interference maybe suspected • Re-extract/reanalyze once if matrix is not a factor • Narrate all outliers
	Matrix spike duplicate(MSD) or Matrix Duplicate (MD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within QC acceptance criteria (Attachment X)	• Same as MS
	Laboratory control sample (LCS)	1 per preparation batch (≤ 20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze LCS • Re-prep/reanalyze LCS and all associated samples • Narrate all outliers
SW-846 8141A Organphosphorus Pesticides by Gas Chromatography	Initial calibration (5 point minimum) Lowest at or below reporting limit (RL)	Prior to analysis and as required	If %RSD < 20% average RF may be used If linear regression used r > 0.995 or R2 >0.990 Alternate evaluation: Mean % RSD for all target analytes <20% with no individual compound >40%	• Average RSD <20% across all analytes may be used if any analyte fails • Evaluate the system • Repeat initial calibration
	Initial calibration verification (ICV), second source Mid level standard	Prior to every analytical sequence	% Difference ≤15% of expected concentration compared to response from ICAL	• Evaluate system/standard • Reanalyze ICV standard • Repeat initial calibration
	Continuing verification standard (CVS) Mid level standard	After every 10 samples and at the end of the analytical sequence	%D or % Drift >15%	• Evaluate system/standard • Repeat sample analysis to last acceptable CVS
	Retention time windows	Established with each new column installation Updated with each daily initial calibration standard	Retention times must be within retention time window established by the daily initial calibration standard Every CVS and every sample	• Evaluate system/standard; pattern recognition may be sufficient for multi-component compounds only • Reanalyze CVS/affected samples
	Target analyte confirmation	All detected analytes	RPD < 40%	• If greater than 40% qualify data as estimated

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8141A Organphosphorus Pesticides by Gas	Method Blank	1 per preparation batch (≤ 20 samples)	< ½ RL	• Reanalyze blank • Reprep/reanalyze blank and associated samples
	Surrogate spike	Every sample, method blank, LCS and MS/MSD	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze • Reprep/reanalyze once • If still out, report both sets of data • Narrate all outliers
	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze • Reprep/reanalyze once • If still out, report both sets of data • Narrate all outliers
	Matrix spike duplicate(MSD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within QC acceptance criteria (Attachment X)	• Same as MS
	Laboratory control sample (LCS)	1 per preparation batch (≤ 20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze LCS • Reprep/reanalyze LCS and all associated samples • Narrate all outliers
SW-846 8151A Organochlorine Herbicides and Pentachlorophenol by Gas Chromatography	Initial calibration (5 point minimum) Lowest point at or below PQL	Prior to analysis and as required	%RSD <20%. average CF may be used; linear calibration required	• Average RSD <20% across all analytes may be used if any analytes fail • Evaluate the system • Repeat initial calibration
	Initial calibration verification (ICV) second source Mid level standard	Prior to each daily analytical sequence	% Difference ≤15% of expected concentration compared to response from ICAL	• Average %D ≤15% across all analytes may be used if any analytes fail • Evaluate system/standard • Reanalyze ICV standard • Repeat initial calibration
	Continuing calibration verification (CCV) Mid level standard	After every 20 samples and at the end of the analytical sequence	% Difference ≤15% of expected concentration compared to response from ICAL for each bracketing standard	• Evaluate system/standard • Reanalyze CCV and all samples back to last acceptable CCV
	Retention time windows	Established with each new column installation Updated with each daily initial calibration standard	Retention times must be within retention time window established by the daily initial calibration standard Every CCV and every sample	• Evaluate system/standard; • Reanalyze CCV and affected samples
	Method blank	1 per preparation batch (≤20 samples)	<Reporting limit	• Reanalyze blank • Re-prep/reanalyze blank and all associated samples
	Surrogate spike DCAA	Every sample, method blank, LCS and MS/MSD	% Recovery within project QC acceptance criteria (Attachment X)	• Re-extract/reanalyze once • If still out, report both sets of data • Narrate all outliers

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8151A Organochlorine Herbicides and Pentachlorophenol by Gas Chromatography	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Assess data (4x rule) • If LCS and surrogate recoveries are within acceptance criteria, matrix interference maybe suspected • Re-exact/reanalyze once if matrix is not a factor • Narrate all outliers
	Matrix spike duplicate (MSD) or Matrix duplicate (MD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within QC acceptance criteria (Attachment X)	• Same as MS
	Laboratory control sample (LCS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze LCS • Re-prep/reanalyze LCS and all associated samples • Narrate all outliers
Total Cyanide SW-846 9012B	Initial calibration curve (six standards and a calibration blank)	Initial daily calibration prior to sample analysis	Correlation coefficient ≥0.995 for linear regression	• Correct problem then repeat initial calibration
	Distilled standards (one high and one low)	Once per initial calibration	Cyanide within ±10% of true value	• Correct problem then repeat distilled standards
	Second-source calibration verification	One per preparation batch (<20 samples)	Cyanide within ±15% of expected value	• Correct problem then repeat initial calibration
	Method blank	One per analytical batch	No analytes detected ≥ Reporting Limit	• Correct problem then reprep and analyze method blank and all samples processed with the contaminated blank
	LCS for all analytes	One per preparation batch (<20 samples)	QC acceptance criteria (Attachement X)	• Correct problem then reanalyze • If still out, reprep and reanalyze the LCS and all samples in the affected AFCEE batch
	MS/MSD	One per preparation batch (<20 samples)	QC acceptance criteria (Attachement X)	• None
Gross Alpha and Gross Beta SW-846-9310	Initial calibration with standard reference materials	Daily before sample analysis	Analytical method control limits	• Correct problem and repeat calibration
	Method Blank	One per analytical batch	No analytes detected ≥ Reporting Limit	• Identify and reduce contamination then reanalyze
	Analytical Duplicate	One per analytical batch	RPD < 20	• Evaluated problem and correct the reanalyze
	Spiked Sample or standard reference material	One per analytical batch	80-120% recovery	• Evaluated problem and correct the reanalyze

EICP Extracted ion current profile
QC Quality control
RF Response factor
RSD Relative standard deviation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